

REMARKS

Claims 1, 4, 6, 11, 15, and 27 are amended; claims 5 and 50 are canceled. No new matter is presented. Claims 1-4, 6-25, 27-35, 38-43, 46-49 and 51-83 are before the Examiner and stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dias et al. (WO/ 02/48257 A2) (hereinafter Dias"). Applicant respectfully traverses. Further examination of the application as amended and reconsideration of the rejections are requested.

Claims 1 and 27 are amended to recite 2-20 phr polybutene, support for which is found in original claim 5, now canceled; claim 6 is amended to depend from claim 4 and recite the polybutene has a viscosity of from 100 to 5000 cSt at 100°C 15, support for which is found in the specification at paragraph [0058]; claims 11, 15, 27 and 46 are amended to recite a total carbon black content of 80-200 phr to clarify the implicit limits are within the range of claim 1; claim 15 is also amended to limit the high surface area black to 60 phr, support for which is found in the examples; claim 42 is amended to recite 2 to 15 phr polybutene oil, support for which is found in claim 10. No new matter is presented.

As an initial matter, applicant respectfully traverses the finality of the first action following submission of the RCE as premature. MPEP 706.07(c). The RCE included further amendments and presented claims to subject matter not previously claimed. For example, the subject matter of claim 5 (2-20 phr polybutene oil *and* the polybutene has a number average molecular weight greater than 700) is not the same as any previously presented claim. The "same invention" means an invention drawn to identical subject matter. See MPEP 804(II) and (II)(A), citing *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957). A claim that is broader or narrower in any respect is not the same invention. *Id.* First action finality following an RCE is not appropriate where, as here, applicant presents claims drawn to subject matter that is different from the invention claimed in the earlier application. MPEP 706.07(b). Applicant respectfully requests withdrawal of the premature finality of the first action. MPEP 706.07(d).

In the alternative, if such is required, applicant submits that the amendment and evidence submitted herewith represent a bona fide effort to place the case in condition for allowance and/or better form for appeal, and do not raise any issues that would require further searching.

The first/final Office Action asserts that applicant has not shown nonobviousness because (1) no side-by-side comparative examples are provided and (2) applicant's data are not reasonably commensurate in scope with the claims. Applicant respectfully traverses both assertions, and submits herewith the Declaration of Walter H. Waddell ("Waddell Declaration"), incorporated herein by reference, for the consideration of the Office.

In accordance with this invention it has been discovered that an isobutylene elastomeric composition comprising a measured amount of carbon black having a surface area of less than 30 m²/g and a measured amount of polybutene oil obtains an elastomer composition of reduced air permeability, with the ability to maintain other rubber blend properties such as strength, flexibility, processability, etc. Dias does not teach or suggest the criticality of using a low surface area black above the claimed critical threshold phr levels in combination with specified polybutene oil, nor does it teach or suggest applicant's unexpected results of improved (reduced) permeability while retaining the capability of tailoring the desired physical and processing characteristics required for an air barrier.

The Office Action faults applicant's showing for allegedly presenting comparative data only for carbon black in an amount of 60 phr. Applicant's independent claims are currently limited to "80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm."

It is respectfully submitted that side-by-side examples are not the only way to evidence nonobviousness of the claimed invention, and evidence of unexpected properties may be in the form of either a direct or an indirect comparison with the closest prior art which is commensurate in scope with the claims. See MPEP 716.02(b)III, citing examples of cases where indirect comparative testing was found sufficient to rebut a *prima facie* case of obviousness.

In the present case, applicant has used a space modeling approach and statistical analysis that are conventionally employed when dealing with a wide range of variables and complicated, lengthy procedures for collecting data. This provides a reliable statistical profile, but considerably reduces the amount of data that needs to be obtained as compared to a full factorial approach. Waddell Declaration, paragraph 6. In the present case, 13 runs were used to map the effects on numerous dependent variables of N660 (high surface area carbon black), Regal 85

(low surface area carbon black), Calsol 810 (naphthenic oil), and Parapol 1300 (polybutene oil). *Id.*

The mapping software shows that the use of more than 60 phr of a high surface area carbon black might reduce the permeability only slightly if at all, but the Mooney viscosity would be adversely impacted and could not be maintained by the addition of polybutene oil. Waddell Declaration, paragraph 12. The mapping of these data allow accurate prediction up to 14 phr polybutene and up to 60 phr N660 (the limits of the design space), and show additional amounts of N660 would irreparably render the composition unprocessable. Waddell Declaration, paragraph 13. This is also shown by the data in the application for Compositions 1 and 2 in Tables 5 and 6 which employ 93.4 phr N660 and make the composition unacceptably brittle and too thick to commercially process. *Id.* There is no point to any side-by-side comparison with an 80 phr N660/Parapol 1300 formulation in this case because it is clear that such a comparison would be worse than the standard reference formulation composition used in the art as disclosed in Dias. Note that 60 phr N660/14 phr Parapol 1300 is on the statistical map provided by applicant's data in Compositions 8-22.

In contrast, the statistical mapping software indicates that there is a pronounced interactive effect on processability (Mooney viscosity) between low surface area blacks like Regal 85 and polybutene oil, that is not seen between high surface area blacks like N660 and polybutene, or between naphthenic oils like Calsol 810 and any carbon black. Waddell Declaration, paragraph 9. The discovery of this unexpected interaction alone refutes any prima facie obviousness rejection. The unexpected interaction between the low surface area carbon blacks and polybutenes is such that a low surface area black can be used in a higher proportion to reduce permeability, but processability and end properties can be maintained with the polybutene oil used in combination with the low surface area carbon black. See Waddell Declaration, paragraph 14.

A retrospective explanation of the effect of the low surface area carbon black and high molecular weight polybutene can be theorized. It is possible that the low surface area of the carbon black provides less of a reinforcement effect on the rubber at higher concentration, allowing the rubber to be processed and avoiding brittleness. The low surface area of the black and the higher molecular weight of the polybutene oil could also result in less adsorption or

affinity of the oil on the black so that the oil can effectively reduce viscosity. Also, the relatively high molecular weight of the polybutene can mean that permeability is not affected so much (increased) as with the naphthenic oils, but on the other hand, the higher the molecular weight of the polybutene oil, generally the less effect on reducing the Mooney viscosity.

The above discussion is largely limited to the properties of Mooney viscosity and permeability for simplicity, however, there are many result variables which must all be taken into account for commercial viability of a butyl rubber, for example: Mooney scorch (indicative of time before the composition begins to cure and becomes too thick to process); Mooney viscosity (too high and the batch is too thick to process, too low and it is too soupy); hardness (too high results in brittleness, not desirable in tire innerliners/inner tubes); adhesion to NR (high value needed to bond to other tire components); and permeability (desirably low to retain inflation pressure). Only applicant's discovery of the combination of a relatively large amount of low surface area carbon black with a high molecular weight polybutene is shown to possess the ability to be tailored to balance the necessary parameters. See specification at paragraph [00109].

With respect to point (B), the office action asserts that the data are insufficient to establish the criticality of (1) DBP < 80 cm³/100g; (2) 200 phr carbon black; (3) polybutene Mn > 700 and 100°C viscosity of 10-6000 cSt; and (4) elastomer with > 30 mol% isobutylene.

For DBP, which is a measure of dibutyl phthalate oil the black will absorb (see specification at paragraphs [0067] and [0068] and Table 2), applicant investigated both blacks having less than 80 cm³/100g (Regal 85 = 33; Regal 90 = 32; N990 = 42), and greater than 80 (N660 = 90). The blacks with a DBP less than 80 (32-42) worked; greater than 80 (90) did not. Therefore, the exact limit is somewhere between 42 and 90 and the data would support a claim to an upper DBP limit of "less than 90." Applicant's recitation of less than 80 cm³/100g is clearly supported by comparative examples above and below the parameter specified. Furthermore, claims 2-4 recite DBP < 75.

For the phr carbon black up to 200, applicant has shown that 120 phr low surface area carbon black is not the upper limit. Additional high surface carbon black can be used, e.g. 60 phr N660 in the examples. Furthermore, 100 phr Regal 85 corresponds to a midrange proportion of polybutene oil, allowing the inference that the amount of black could be doubled to 200 phr by using the upper range of polybutene investigated. Waddell Declaration, paragraph 14. As noted

above, the present amendment clarifies that the upper limit of 200 phr is for the total carbon black present, not just the low surface area black. Moreover, the rejection overlooks the recitation of 80-180 phr black in claim 83, 80-160 phr in claim 82, and 80-140 phr in claim 81, and should be withdrawn at least with respect to these claims.

The molecular weight and viscosity characteristics of the polybutene processing oil function over a continuum and are selected to impart different characteristics to the elastomeric composition. For example, the viscosity can be adjusted depending on the desired viscosity of the composition. See specification at paragraph [0062]. Based on the data in the specification for Parapol 1300 and Parapol 2400 there is no reason to expect that polybutene with Mn and viscosity in the claimed ranges would not be operable in one or more embodiments.

For the 30 mol% isobutylene, this is the definition of a particular class of elastomers known as butyl rubber. It is well known that elastomers containing less isobutylene than this no longer possess the characteristics of isobutylene-based elastomers, whereas isobutylene-based elastomers with higher isobutylene content as a class share common properties such as good regularity of the polymer chains, crystallization on stretching, high tensile strength, small extent of unsaturation, etc. This simply defines the class of materials with which applicant is concerned. It is understood that the rejection on this ground is applicable to claim 1 only, and is not asserted against the various other claims specifying specific elastomers and/or different isobutylene contents. See claims 2-4, 6-7, 16-17, 27-35, 38-42, 46-69, 73, 76, and 78-79.

It is respectfully submitted that the statistical data presented by applicant meet or exceed any requirement for comparative testing. They show that carbon blacks with a surface area less than 30 m²/g and especially less than 25 m²/g will result in the ability to match physical properties with a lower permeability, and that polybutene oils of MW above 700 can be utilized therewith to obtain heretofore unknown advantages. They show that the claims are statistically commensurate in scope. And they support the unmistakable conclusion that the embodiments of Dias, both preferred and unpreferred, did not enable or render obvious the subject matter claimed herein.

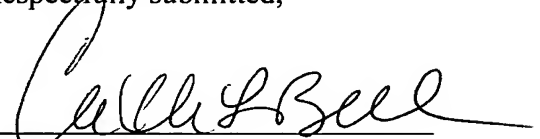
Having addressed all issues set out in the office action, Applicant respectfully submits that the pending claims are now in condition for allowance. Applicant invites the Examiner to telephone the undersigned attorney if there are any issues outstanding which have not been

addressed to the Examiner's satisfaction. The Commissioner is hereby authorized to charge counsel's Deposit Account No. 05-1712, for any fees, including extension of time fees or excess claim fees, required to make this response timely and acceptable to the Office.

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Date

Respectfully submitted,



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